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BY D. SEMPLE, M.D., MAJOR, R.A.M.C., DIRECTOR.

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II.—A FEW FACTS ABOUT "FIRST AID TREATMENT" WHEN BITTEN BY A RABID ANIMAL.

In last year's report the technique of anti-rabic treatment as carried out at this institute was described; also the method of attenuating rabies virus, and the preparation of the vaccine, together with the leading facts connected with rabies virus, and its mode of infection, were described in detail. On this account these subjects may be dismissed from the present report.

There are, however, a few elementary details connected with what I may term the "first aid treatment" of persons bitten by rabid animals which were not discussed in last year's report, and which I shall now describe, because I believe they are important and useful as far as the general public are concerned.

When a person has been bitten by a rabid animal, it is most important that the wound or wounds should be attended to at once.

Proper attention to the wounds means cauterisation at the earliest possible moment.

Pure carbolic acid is the best and least painful application to use. It should be well swabbed into the wound and then washed out with water immediately afterwards to prevent too much destruction of the tissues. Carbolic acid has the advantage of penetrating into the crevices of the wound, and is not prevented from doing so by the presence of grease or fatty tissues. In addition to its bactericidal properties, the fact that it penetrates into the minutest recesses of the wound is most important.

Crude phenyle does very well, and answers much the same purpose as carbolic acid. It has the additional advantage of being within the reach of most people in India. When applied the wound should be washed immediately afterwards with water.

Caustic potash, caustic soda, and nitrate of silver are also fairly good when well rubbed into the recesses of the wound, but they cause considerable pain.

Nitric acid is a very painful application, and burns deep into the tissues, leaving ugly scars.

The application of a red-hot iron to the wounds is also a painful proceeding, and leaves a surface which takes some time to heal.

Turpentine is also said to be efficacious, but I do not know of any proof to this effect.

Cauterisation, if thoroughly carried out within a few minutes of the infliction of the bite, will prevent the subsequent onset of hydrophobia in many cases, but not in all. This is the best that can be said for any form of cauterisation. The object aimed at is to get rid of all the virus which the rabid animal has implanted in the wound, and, failing this, to get rid of as much of it as we possibly can. Cauterisation destroys the virus *in situ*. In case there is nothing else at hand, it is better to wash the wound with water than to do nothing at all. If the washing is done early, a certain amount of virus is sure to be washed out. An antiseptic lotion is better than water, and the stronger it is so much the better.

After the bite from a rabid animal, the time which elapses before the onset of hydrophobia depends greatly on the amount of virus implanted in the wound. The smaller the amount of virus the longer the incubation period. If cauterisation cannot be relied upon by itself to prevent the disease, it at least destroys some of the virus *in situ*, and ensures a longer incubaton period, and consequently gives more time for treatment to be carried out at a Pasteur Institute. It is said to be beneficial up to 24 hours after the infliction of the bite, but it is very questionable whether it does any good after 8—10 hours. It is probably not much good after 3—4 hours, and it is certainly no good after 24 hours.

There is only one rule to observe as regards time, and that is, the sooner the better.

It is a mistake to put on a ligature above the wound, when situated on the limbs; and in my opinion it is also a mistake to suck the wounds or excise them. Owing to the fact that the virus infects the nerves, the application of a ligature cannot possibly prevent this, or do good in any way.

When a person sucks the wound there is always the possibility of some virus from the wound infecting the lips or gums. There would be no danger of infection in sucking the wound, provided the mouth and lips were absolutely sound, but this is not always the case, on account of decayed teeth and cracked lips.

In excision there is always the danger of the virus in the original wound infecting the larger wound made by the excision.

III.—PRECAUTIONS WHICH SHOULD BE TAKEN WHEN A PERSON IS BITTEN BY AN APPARENTLY HEALTHY DOG.

It will be gathered from the preceding remarks that the proper course to pursue when bitten by an animal known to be rabid is to have the wound cauterised at the earliest possible moment, and then take the first available train for a Pasteur Institute.

When bitten by an apparently healthy dog, the method of procedure is somewhat different, and for the following reasons:—

(1) For two or three days before a dog shows any apparent symptoms of rabies his saliva contains rabies virus, and consequently his bites are capable of transmitting the disease.

(2) In exceptional cases the saliva may be infective for as long as seven, eight, or nine days without any apparent symptoms of rabies.

These are facts to be remembered when one is bitten by any dog, no matter how healthy he looks.

The practical application of these facts suggests the following precautions:—

1. When bitten by an apparently healthy dog, have the animal tied up and kept under observation for 10 days from the date of the bite. If at the end of that time the dog is still healthy the person bitten has nothing whatever to fear as regards infection, even should the animal develop rabies at any time after the 10 days.

Under no circumstances could the saliva of a dog be infective and the animal remain alive and well for 10 days afterwards. It is very evident that it would be a mistake to destroy a dog immediately after it has bitten any one, because then all information regarding his condition would be cut away, unless a small portion of his brain was sent in glycerine to a Pasteur Institute for experimental purposes.

The experimental test takes 14 days at least—possibly 18 or 20 days. Unfortunately the miscroscopic tests cannot as yet be relied upon to diagnose a rabid brain or cord in all cases.

2. Should the dog under the above circumstances show signs of rabies within 10 days, the person bitten should proceed to a Pasteur Institute for treatment immediately the animal shows the first symptoms. On the other hand, should the dog only commence to show symptoms on the 11th or 12th day after inflicting the bite (or on any later date) the person bitten would not require to be treated.

3. A person severely bitten on the head or face by an apparently healthy dog would not be justified in waiting 10 days to know whether the animal had rabies or not, before undergoing Pasteur treatment. A delay of 10 days or even 4 or 5 days in a case of this kind might be disastrous, as it might then be too late for successful treatment. Under these circumstances the safest course to pursue would be to commence treatment, and stop it as soon as it became evident that the dog was not infective.

A person bitten by an apparently healthy dog on any part of the body other than the head or face, could afford to wait in order to see what happened to the animal when tied up for 10 days, because the chances are, in the very early stage of the disease before symptoms became apparent, that there would be very little virus in the animal's saliva.

4. A bite from any dog should be cauterised at the earliest possible moment, no matter what the animal's condition appeared to be.

For the reasons given above, one can well understand why people strongly object to be bitten by any dog.

IV.—MISCELLANEOUS POINTS CONNECTED WITH RABIES.

I have found it necessary to enter into the subjects of the cauterisation of wounds inflicted by rabid animals and the precautions to be taken when bitten by apparently healthy dogs, simply because during the past year I have been plied with numerous questions on these subjects.

For the same reason there are a few more points connected with rabies which require to be explained namely—

1. The earliest period at which a man or animal bitten by a rabid animal could possibly show any symptoms of hydrophobia or rabies, would be 14 days after being bitten, and probably not sooner than 3 weeks, and this only in exceptional cases.

It could only be 14 days, provided the rabid animal implanted the virus on the surface of the brain of the man or animal bitten, which is almost an impossibility.

The incubation period of the "virus of the streets" (dogs', jackals', and wolves' virus) when inoculated on the surface of the brain, is 14 days as a rule. In exceptional cases it may be a few days more or less.

When the bites are situated on the head or face the incubation period is more than 14 days. When the bites are situated on other parts of the body the incubation period is longer still. When the bites are slight, and only a small amount of virus implanted into the wounds, the incubation period may be several months

The nearer to the brain the wounds are situated the shorter the incubation period, and it is shortest of all when the virus is put directly in contact with the brain.

In addition to the wounds being near the brain there are also a few more factors which assist in reducing the incubation period, *viz.*, very deep and multiple wounds, and wounds inflicted on parts of the body where nerves are numerous.

Rabies virus prefers to grow in nerve tissues, and it only gives rise to rabies when it multiplies in the nerve centres (brain and spinal cord). It reaches the nerve centres by growing along the nerves from the seat of the bites.

These facts explain why it is that bites on the head and face, or deep and multiple bites on other parts of the body where nerves are plentiful, must always be looked upon as serious. Cases of this kind require rigorous and early treatment.

2. During the past two years I have received numbers of letters from people bitten by mad dogs, asking me how long they could, with safety, put off treatment, their excuse being that they were so busy then that they could not possibly come. My answer has always been by a telegram which generally settled the question of any further delay. Others have written to me more or less to the following effect:—"I have been bitten by a mad dog last week" (or a few days ago as the case may be), "the wound has healed up, and I feel no bad effects; is there any necessity for treatment?"

Judging from these letters, it is very evident that the general public require to be enlightened on the very great importance of early treatment and also on the fact that the bite from a rabid animal heals as quickly as the bite from a healthy animal, and is not likely to be followed by any bad effects until symptoms of hydrophobia set in.

The appearance of the bite, and its disposition to heal or otherwise, is no index whatever as to whether it was inflicted by a rabid animal or not.

3. The foregoing facts also apply to dogs and other animals when bitten by rabid animals. A dog bitten by a rabid dog or jackal is quite safe for a fortnight at least, or probably three weeks.

The most likely time for rabies to develop would be between the third and fifth week.

Two months would cover the incubation period in most cases. Some would go on until three months and in exceptional cases for six months or longer.

Not more than 60 or 70 per cent of dogs bitten by mad dogs develop rabies. The percentage of rabies cases would be higher after the bites from rabid jackals, about 85 per cent.

These facts would suggest the precautions to be taken when a valuable dog is bitten by a rabid dog or jackal, also the chances of his escape from rabies.

Unless a dog is a valuable one and worth the trouble of keeping him tied up for from 3 to 6 months, the safest plan would be to have him destroyed.

There is always a risk to both the owner and his neighbours in keeping infected dogs under observation for such a time.

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